Citation:

Whelton SP, He J, Whelton PK, Muntner P. Meta-analysis of observational studies on fish intake and coronary heart disease. *Am J Cardiol.* 2004;93(9):1119-23.

PubMed ID: 15110203

Study Design:

Meta-analysis

Class:

M - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

⊕ POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To determine if fish consumption is associated with lower fatal and total CHD.

Inclusion Criteria:

- Full-length, English language;
- Conducted in adult humans;
- Used an observational case-control or cohort study design;
- Compared a group that consumed fish on a regular basis with a group that consumed little or no fish;
- Used CHD as an outcome; and,
- Reported an association in the form of a relative risk (RR), hazard ratio (HR), or odds ratio (OR) of CHD by category of fish consumption.

Exclusion Criteria:

- CHD was not reported as an end point.
- Insufficient data regarding fish consumption.
- Study did not use a cohort or case-control design.

Description of Study Protocol:

Recruitment

- MEDLINE database from 1996 through April 2003.
- Medical subject headings: fishes, fatty acids, omega-3, fish products, fish oils, coronary disease, and myocardial infarction.
- In addition, a manual search of citations from relevant original studies and review articles was performed.

Design: Meta-analysis

Blinding used: not applicable

Intervention: not applicable

Statistical Analysis

- For cohort studies, the RR or HR was used as a measure of the relation between fish consumption and CHD.
- For case-control studies, the OR was used as a surrogate measure of RR, because the absolute risk of CHD was low in each of the studies, a situation in which the OR should provide an accurate estimate of RR, RRs, HRs, and ORs from each study were transformed by taking the natural logarithm and the SE was back-calculated from the reported CIs.
- In one study, p values were used to calculate the SE of the RR.
- In consultation with a registered dietitian, a serving size of fish was deemed to be 114 g (4 oz) in studies that reported grams of fish consumed. A mean value of 0.66 g of omega-3 per serving of fish was calculated using conversion values from the studies that reported grams of omega-3 consumed. With use of these conversion factors, the quantity of fish consumed for each study was analyzed based on the number of servings per week.
- Fixed- and random-effect models were used to estimate pooled effects sizes.
- Both models yielded similar estimates.
- The results are presented based on use of the random-effects model, because of Dersimonian Q test identified significant heterogeneity among the studies.
- A series of prestated subgroup analyses were performed to examine any differences in the association between fish intake and CHD risk by covariables. The subgroups were chosen on the basis of biologic plausibility and a desire to recognize any variation attributable to differences in study design. For each subgroup, the pooled-effects estimate is reported using a random-effects model. Two studies with >75% male participants were included in the male subgroups for total CHD calculations.

Data Collection Summary:

Timing of Measurements

- Varied among included studies.

Dependent Variables

- RR of CHD mortality
- Mean RR of total CHD

Independent Variables

- Fish consumption

Control Variables: none listed

Description of Actual Data Sample:

Initial N: 57 articles were initially identified

Attrition (final N): 19 studies (14 cohort and 5 case-control; 228,864 participants)

Age: varied among included studies (ranged from 22-87 years of age)

Ethnicity: not given

Other relevant demographics:

- Nine studies included only men and two studies included only women, and the remaining studies included mean and women (n=8).
- Fish oil supplementation was reported in 1 study, but no more than 4% of the participants in that study took fish oil as a supplement.

Anthropometrics not given

Location:

- Netherlands
- USA
- Finland
- Italy
- Denmark
- China
- Japan
- Spain

Summary of Results:

Key Findings:

Fatal and Total CHD:

- In 6 cohort studies, fish consumption was associated with a statistically significant reduction in fatal CHD, and in 1 cohort and 4 case-control studies, fish consumption was associated with a statistically significant reduction in total CHD.
- The overall pooled estimate of the RR of fatal CHD for those consuming any amount of fish versus those consuming little to no fish was 0.83 (95% CI 0.76 to 0.90; P<0.005).
- The corresponding estimate for total CHD was 0.86 (95% CI 0.81 to 0.92; P<0.005).

Subgroup analysis:

- An inverse relation between fish consumption and fatal CHD was observed in all but 1 of the subgroups, with the caveat that this hypothesis could not be tested in case-control studies.

Author Conclusion:

- The results indicate that fish consumption is associated with a significantly lower risk of fatal and total CHD.
- These findings suggest that fish consumption may be an important component of lifestyle modification for the prevention of CHD.

Reviewer Comments:

Limitation as stated by authors:

- *Dependence on studies in which some of the comparison groups consumed fish. As in any observational study investigating dietary factors, assessment of the exposure variable is likely to have been somewhat inaccurate, and some misclassifications may have occurred in the assignment of consumption categories.*

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions

1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	Yes

Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search termsused described?	Yes
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	Yes
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	Yes
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	Yes
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issued considered? If data from studies were aggregated for meta-analysis, was the procedure described?	Yes
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes

| 9. | Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed? | Yes |
| 10. | Was bias due to the review's funding or sponsorship unlikely? | Yes |

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